

CLAIMS

1. A system for allowing fuel flow from a fuel tank assembly to a fuel rail of an internal combustion engine, the system comprising:
 - a first valve assembly allowing fuel flow from the fuel tank assembly to the fuel rail against a first predetermined bias; and
 - a second valve assembly allowing fuel flow from the fuel tank assembly to the fuel rail against a second predetermined bias, the second valve assembly allowing fuel flow in parallel with the first valve assembly;wherein the second predetermined bias is lower than the first predetermined bias; and
wherein the second valve assembly allows a maximum flow rate of fuel to flow from the fuel tank assembly to the fuel rail that is lower than a maximum flow rate of the first valve assembly.
2. The system according to Claim 1, wherein the second valve assembly includes:
 - an outer shell;
 - a fuel line connecting the fuel tank assembly to the outer shell; and
 - a flapper valve disposed within the outer shell and over the fuel line to provide the second predetermined bias.
3. The system according to Claim 2, wherein the flapper is constructed of a material that provides an elastic bias to generate the second predetermined bias.

4. The system according to Claim 1, wherein the second valve assembly comprises:

a ball; and

a seat;

wherein the ball is normally positioned on the seat against gravitational force to provide the second predetermined bias.

5. The system according to Claim 1, wherein the first valve assembly and the second valve assembly are disposed within an outer shell, wherein the outer shell is disposed within fuel in the fuel tank assembly.

6. The system according to Claim 1, wherein:

the first valve assembly comprises:

an outer shell;

a valve element disposed within the outer shell;

a biasing member pressing the valve element into a closed position and providing the first predetermined bias;

the second valve assembly comprises:

a channel passing through the valve element; and

a valve disposed in the channel and providing the second predetermined bias.

7. The system according to Claim 6, wherein the valve is a ball disposed within the channel to provide the second predetermined bias.

8. A vehicle comprising:
a system for providing fuel from a fuel tank assembly to a fuel rail for an internal combustion engine of a vehicle, the system comprising:
a first valve assembly allowing fuel flow from the fuel tank assembly to the fuel rail against a first predetermined bias; and
a second valve assembly allowing fuel flow from the fuel tank assembly to the fuel rail against a second predetermined bias, the second valve assembly allowing fuel flow in parallel with the first valve assembly;
wherein the second predetermined bias is lower than the first predetermined bias; and
wherein the second valve assembly allows a maximum flow rate of fuel to flow from the fuel tank assembly to the fuel rail that is lower than a maximum flow rate of the first valve assembly.

9. The vehicle according to Claim 8, further comprising:
an outer shell;
a fuel line connecting the fuel tank assembly to the outer shell; and
a flapper valve disposed within the outer shell and over the fuel line to provide the second predetermined bias.

10. The vehicle according to Claim 9, wherein the flapper is constructed of a material that provides an elastic bias to generate the second predetermined bias.

11. The vehicle according to Claim 8, further comprising:
a ball; and
a seat;
wherein the ball is normally positioned on the seat against gravitational force to provide the second predetermined bias.

12. The vehicle according to Claim 8, wherein the first valve assembly and the second valve assembly are disposed within an outer shell, wherein the outer shell is disposed within fuel in the fuel tank assembly.

13. The vehicle according to Claim 8, wherein:
the first valve assembly comprises:
an outer shell;
a valve element disposed within the outer shell;
a biasing member pressing the valve element into a closed position and providing the first predetermined bias;
the second valve assembly comprises:
a channel passing through the valve element; and
a valve disposed in the channel and providing the second predetermined bias.

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14. The vehicle according to Claim 13, wherein the valve is a ball disposed within the channel to provide the second bias.

15. A system for providing fuel from a fuel tank assembly to a fuel rail comprising:

- an outer shell within the fuel tank having a substantially cylindrical shape, wherein the outer shell has a valve seat disposed at a down stream location with respect to fuel flow from the fuel pump to the fuel rail;

- a valve disposed within the outer shell and having a tapered face to seat against the valve seat;

- a spring disposed within the outer shell and biasing the valve against the valve seat;

- a channel disposed within the valve, wherein the channel has a narrow portion proximate the down stream location of the valve and a wide portion proximate an upstream portion of the valve; and

- a check ball disposed within the wide portion of the channel;

- wherein the spring provides a first predetermined bias to prohibit opening of the valve against fuel flow from the fuel tank assembly to the fuel rail;

- wherein the check ball provides a second predetermined bias to prohibit fuel flow from the fuel tank assembly, through the channel, and to the fuel rail;

- wherein the first predetermined bias is greater than the second predetermined bias; and

- wherein the valve allows a larger fuel flow from the fuel tank assembly to the fuel rail when the valve is in an open position than does the channel when the check ball is in an open position.